HAWAII COOPERATIVE EXTENSION SERVICE
College of Tropical Agriculture and Human Resources
University of Hawaii
GENERAL HOME GARDEN SERIES No. 14

AVERAGE COMPOSITION OF SOME FERTILIZER MATERIALS CONTAINING THE SECONDARY (MINOR) PLANT NUTRIENTS AND THE MICRONUTRIENTS (TRACE ELEMENTS)[1]

by Wade W. McCall*

Material	Percent plant food[2]	Relative availability of plant food	Effect of 100 pounds of material on soil reaction[3]		Salt index[3]
			Acid	Alkaline	
Aluminum Sulfate	17 Al[5], 19 S	Moderate to Slow	170		
Borax	11.7 B, 7 Na[5]	Quick		55	
Copper Chelate	13 Cu	Quick	n	n	
Copper Oxide	75 Cu	Quick			
Copper Sulfate	24.8 Cu, 12.8 S	Quick			
Iron Chelate	6-12 Fe	Quick	n	n	
Iron Sulfate	19.7-24 Fe, 11.5-13.2 S	Quick			
Kieserite	18.2 Mg	Quick to Slow	n	n	1.2
Magnesium Oxide	49-60 Mg	Quick		220	
Magnesium Sulfate	11-16 Mg, 22-24 S	Quick	n	n	2.7
Manganese Chelate	9-12 Mn	Quick	n	n	
Manganese Oxide	48-77 Mn	Slow			
Manganese Sulfate	25-28 Mn, 13-14 S	Quick	n	n	2.7
Sodium Molybdate	38-39.5 Mo, 19 Na[5]	Rapid	n	n	
Molybdic Oxide	58-62 Mo	Quick	n	n	

(over)

Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Noel P. Kefford, Director of the Institute and Dean of the College, Cooperative Extension Service, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa, Honolulu, HI 96822. An Equal Opportunity Employer providing programs and services to the citizens of Hawaii without regard to race, color, national origin, or sex.

Material	Percent plant food[2]	Relative availability of plant food	Effect of 100 pounds of material on soil reaction[3]		Salt index[4]
			Acid	Alkaline	
Zinc Chelate	9-14.2 Zn	Quick	n	n	
Zinc Oxide	70-80 Zn	Slow			
Zinc Sulfate	22-26 Zn, 12-17.6 S	Quick			
Gypsum	23 Ca, 18 S	Slow	n	n	0.3
Dolomitic Limestone	18.5 Ca, 12 Mg	Slow to Very Slow		100-109	
Calcitic Limestone (Ground Coral)[6]	32-39 Ca	Slow to Very Slow		89-99	0.1
Hydrated Lime	44-54 Ca	Quick		172	0.1
Sulfur	30-99.6 S	Slow	95-316		
Cobalt Sulfate	21 Co, 11.3 S	Quick	n	n	
Silicate Slag	36 Ca, 18 Si	Slow to Very Slow			

[1]The percentages given in this table are average figures or indicate a range in composition. When obtaining fertilizer materials, always purchase according to the guaranteed analysis of the material. The materials included in this table may not all be available for purchase at any given time.

[2]Chemical symbols for elements are: S, sulfur; Na, sodium; Cu, copper; Fe, iron; Mg, magnesium; Mn, manganese; Mo, molybdenum; Zn, zinc; Ca, calcium; Si, silicon.

[3]Acid--increases the acidity of the soil as measured by the amount of calcium carbonate ($CaCO_3$) required to neutralize its effect upon the soil. Alkaline--reduces the acidity of the soil to the extent of an equivalent amount of $CaCO_3$. "n" indicates material has negligible effect upon the soil reaction.

[4]Salt index is based upon per unit (20 pounds) of plant nutrient, or 1 percent of a ton. Where no value is given, the effect is negligible or the effect is not know.

[5]Aluminum and sodium are not considered essential for plant growth. These elements may be toxic to plants if present in too great quantities.

[6]Also known as "Agricultural Lime".

*Soil Management Specialist

Reprinted June, 1980—2M